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# SOME TROPICAL AQUARIUM FISHES

Prepared in the Division of Fishery Biology

The species of tropical or exotic fresh water fish that have found favor among aquarists are so numerous that it is impossible to limit a discussion of "tropicals" to a selected few without omitting many that justly deserve consideration. In selecting the species for this memorandum only a few of the better known and more popular ones have been chosen. Accounts of these and many others, with pictures, are to be found in the books listed at the end.

The most popular live-bearers all belong to the family Poeciliidae. The egg-laying fishes that have attained the widest popularity belong to five families: The Characidae, the Cyprinidae, the Anabantidae, the Chichlidae, and the Ambassidae.

## POECILIIDAE (Live-bearing Tooth-Carps)

The live-bearing fishes that have become popular in aquaria all belong to the family Poeciliidae. They are recognized easily by the anal fin of the males, which is modified into an elongated gonopodium or intromittent organ. The native range is confined to the warmer parts of North and South America.

Such fishes are designated by a majority of the laymen as viviparous. Strictly speaking, they are not viviparous inasmuch as the mother's body only furnishes a safe place for the eggs to hatch. The eggs are fertilized and hatch in the oviducts of the female without receiving any nourishment other than that supplied by the egg. Correct terminology calls for the term ovoviviparous in describing the type of reproduction found among this group of fishes.

The processes of courtship and fertilization are interesting, especially since they are so different from those commonly associated with fishes. The male swims about the female with a great display of fins and color. The swimming and display apparently are for the double purpose of soothing the male vanity and maneuvering into the proper position for actually fertilizing the eggs as the female appears uninterested and makes no response to his attention. Copulation consists of one quick thrust of the gonopodium, the tip of which is inserted

into the entrance of the oviduct for a brief instant. The tip of the gonopodium varies in size and shape so greatly with the species that the possibilities of cross-breeding are mechanically limited. The males of live-bearing fishes, unlike most other live-bearing animals, pursue the female during the gestation period.

The young are delivered in about four or five weeks after fertilization if the water is maintained at about 75 degrees. Colder water delays development of the young. Delivery, after the young are fully formed, apparently is controlled by maternal whims. The young are well developed at birth, and are capable of taking daphnia or finely divided prepared foods immediately.

Precautions must be taken to prevent the young from being eaten. For most species, except "Mollies" the usual practice is to transfer the gravid female to a special aquarium containing some sort of protective device. The device may be of almost any nature so long as it allows the young to pass through but prevents the passage of the mother. Added protection is given when the trap is constructed so that the young find it difficult to return to the upper part of the aquarium. Aquaria thickly planted with plants at one end often give successful protection to the young, and are recommended especially for Mollienisias. The size of the mother influences the number of young born, but has no influence on the size of the young. The average number of young produced is from 40 to 50 but as few as three have been recorded. Any brood of more than 100 is unusual.

One of the peculiarities common to live-bearing aquarium fishes is that four or five successive broods may be produced from a single fertilization.

## The Guppy (Lebistes reticulatus)*

The Guppy is the most popular and widely kept tropical aquarium fish. This species is native to Trinidad, Guinana, and Venezuela. The males are tiny things, about 1-1/8 inches long, while the females are twice that size. One of the interesting things about this species is that no two males are colored exactly alike.

Aside from its beauty, this species is so admirably suited to aquaria that it popularity is no surprise. A list of the admirable characteristics of the Guppy would include the following: It is a live-bearer; is extremely fertile and a dependable breeder; matures in from six to eight weeks; is unusually active; thrives in close quarters; will stand foul water; stands a temperature range of from 65 to 100 degree, although a range of 74 to 82 degrees is preferred; does not fight, is not timid; and is cheap enough for anyone to own. One must search far to find another species with as many points in its favor.

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* Dr. Lechmere Guppy is the name of the man for whom the Guppy fish was named. He was a personal friend of Dr. Wilhelm Peters. Ichthyologist,

Berlin Museum, Germany, who first described the fish, and the name was as a compliment to Dr. Guppy. As far as is known the dates of Dr. Guppy's birth and death are not recorded in any official records. The exact date of Dr. Peter's death is not known, but is thought to be between 1870 and 1880.

Several strains of Guppies have been established by selective breeding, each with its own characteristic markings or fin development. Anyone who is interested in experimenting will find the breeding of Guppies for new patterns an absorbing pastime.

This species conforms exactly to the breeding habits given for the family. They grow best with a varied diet. If daphnia are unavailable, feedings of shrimp, finely chopped earthworms, etc, are advised at intervals.

## The Mollienisias (Mollienisia latipinna)

The Mollienisias' native habitat covers a wide range (Gulf States and Northeastern Mexico) thus leading one to expect a wide variation in appearance. The dorsal fin apparently is the most variable, ranging from rather small to the huge sail-fin so prized by aquarists. The fish itself is about 3-3/4 inches long. The body is olive colored with five narrow brown strips formed by a sawtooth pattern of lighter color. The anal fin is of flashing metallic blue on the upper and lower thirds. The center third is of golden yellow, as is the forward part of the belly. The dorsal fin shows a gently blue iridescence.

More care is required to breed Mollinesias successfully than for any of the other live-bearers. Lots of room must be provided, thus making it impossible to use small breeding traps. The gravid females suffer from handling. If the female must be transferred from one aquarium to another, it should be done before she becomes very heavy with young. When single pairs are being mated, it is more advisable to remove the male. Such a precaution is not entirely essential inas much as this species ordinarily does not eat the young.

"Mollies" are largely vegetarians, feeding to a great extent on algae. A well planted aquarium placed in a sunny situation stimulates the growth of their natural food. A good staple diet is made of boiled cereal containing some dried shrimp and spinach. Live daphnia and mosquito larvae make good additions to the diet, but should not be given constantly. This species is very active, and requires feeding from four to six times every 24 hours.

One thing that puzzles owners is that they have so seldom been able to rear the sail fin variety from sail-fin stock in their aquaria.

The black or Midnight Mollies are usually a race of M. latipinna. Selective breeding has developed a strain of almost perfect velvety black. A true sail-fin appears not infrequently. Many aquarists consider the black sail-fin Mollie the height of aquarium perfection, especially when the fin is edged with thin golden yellow line along the top.

Still other aquarist insist that M. velifera from Yucatan is the kind of the Mollienisias. Its crowning glory is the big sail-like dorsal. This fish is not brilliantly colored but it does not need gorgeous coloring to be attractive. An easy way to distinguish this species from the sail-fin variety of M. latipinna is that the dorsal of M. velifera is marked with white circular dots with black borders, while in M. latippina the marking is black streaks without circular white centers. Also, the adult M. velifera is the larger of the two species, reaching a length of five inches.

Mottienisia sphenops is another popular species. They show a great variety of colors and patterns. This species is recognized by its shorter dorsal, and the fact that the dorsal is inserted further towards the tail.

## The Swordtail (Xiphophorus hellerii)

The swordtail's most striking feature is the prolongation of the lower rays of the tail fin of the adult males to form a long, swordlike spike. This spike must not be confused with the gonopodium which is developed from the anal fin. The species shows a wide variety of brilliant colors. One of the most constant color patterns is the black edging of the spike, although this is sometimes absent. The native habitat is Eastern Mexico. They reach a length of 2-3/4 inches exclusive of tail spike.

This species should be kept in a temperature range of from 72 to 80 degrees. Some individuals never recove from the "shimmies" resulting from a single chilling. They eat algae, or if that is not obtainable, finely chopped worms does very well as a substitute. Their breeding habits are as described for the family.

The fact that the males are wonderful jumpers makes it necessary that proper precautions be taken to prevent specimens from jumping out. The males also bully one another to quite an extent. It is advisable to keep only one male in each aquarium.

A prolific strain of red swordtails has become popular. This is a hybrid strain (Platy-swordtail) of rather dubious history. A previous red swordtail was produced from an unknown red Platy-swordtail cross, but few of these were fertile.

## The Moonfish or Platy (Platypoecilus maculatus)

The original Platy wild stock, as found in the Rio Papioapan, Southern Mexico, was grayish brown or olive, with a tendency towards blue or green iridescence. The body was covered with fine black dots, and the dorsal fin contained a fair amount of brick red color. Aquarium care has reduced the size of the female to about two inches and increased the size of the male until he is only about one-half inch shorter.

Selective breeding has developed well fixed color strains such as the Blue, Red, Black, and Golden. Cross-breeding between these fixed strains has resulted in a great variety of color patterns. In addition

to these, the Platys have contributed to an assortment of hybrids. With no other aquarium fish is it possible to conduct such elaborate studies of inheritance of characteristics.

The aquarist interested in maintaining a pure line, or in securing certain cross-breeds, must be on the alert to prevent undesired matings. The fish themselves pay no attention to the color of their mates.

Platies breed much as do Guppies, except that they do not do as well with breeding traps and are less inclined to eat their young. A thickly planted aquarium having a temperature of about 74 degrees gets best results. Algae, or prepared cereal food, should be fed liberally when the young are expected.

All platies are good community aquarium fish and stand a temperature range of from 65 to 90 degrees. They are always on the move. If kept in a well planted aquarium and not disturbed they seldom leap from the water.

## CHARACINS (The Characins)

The Characins from one of the largest families of fishes. Their native habitat is tropical America and Africa. Some of the Characins and carps (family Cyprixidas) look so much alike that the beginner sometimes confuses them. Two easily observed characters definitely separate the groups. The carps never have teeth in the jaws or an adipose fin. The Characins possess both teeth and an adipose fin. Certain species may lack either one or the other of these distinguishing characters, but rarely if ever does a species lack both. (The adipose is a tiny fin without rays on the back just in front of the tail.)

Although any fish armed with teeth is a potential fighter, the Characins are, on the whole, quiet, harmless little fellows. It is true that they occasionally nip at a neighbor's fin, but the nipping is done so slyly that there is no indication of fighting.

These fishes are rather hardy, temperatures of from 70 to 75 degrees usually being satisfactory although most species require a temperature of about 80 degrees for spawning. The eggs are adhesive or semi-adhesive and receive no care from the parents, who are inclined to eat both eggs and young. A few species are easily bred. Their food habits are easily met for they thrive on almost any of the good fish diets, although they do best when the food is varied. They seem to like a change to living or fleshy foods particularly well.

## Head-and-Tail-Light Fish (Hemigrammus ocellifer)

The Head-and-Tail-Light Fish is one of the most popular of the aquarium fishes. It would be attractive without the "lights" but with them it is an inch and three-fourths of beauty and wonderment. When seen under an overhead light, the upper part of the eye and top of the tail base shines as though made of glowing copper. The popular belief is that these spots are in themselves luminous, but in reality they are only spots

from which light is reflected to give the illusion of glowing copper.

This species is vigorous and grows to a length of about 1-3/4 inches. It will tolerate a temperature range of from 68 to 84 degrees. Any of the accepted diets seem to be satisfactory, but there should be an occasional meal of daphnia or other live food.

These fish are not very difficult to breed. The aquarium should be at least partly filled with a thicket of finely divided plants, such as Myriophyllum. After some very vigorous driving by the males, the pair assumes a close parallel position in the thicket. The eggs are dropped and fertilized while the fish are in this position. Most of the eggs stick to the leaves, but those that drop to the bottom may hatch. The young are very tiny and are fed best on green water or Infusoria.

The native home of the Head-and-Tail-Light Fish is in British Guiana and the Amazon.

## The Bloodfin (Aphyocharax rubripinnis)

Another of the Characins that has become popular is the Bloodfin. This 1-3/4 inch native of the Argentine combines distinct beauty with unusual hardiness. The flaming fins contrast beautifully with the silvery to purplish hues of the body. They show to best advantage when in groups. Whether through vanity or courtesy to the proud owner, they seem to prefer living in the middle of the aquarium where there are fewer plants. It also seems to prefer a group of its own kind, although it associates peaceably with other species.

The bloodfin is unusually hardy, withstanding temperatures as low as 50 degrees. A temperature range of from 65 to 80 degrees is nothing to cause the aquarist worry, although an average of about 70 degrees gets best results. Another attractive feature, especially to those who do not wish to give a lot of thought to the care of their fish, is that this fish will eat almost any food. No special diet or menu need be prepared.

The breeding habits of the Bloodfin are unique and interesting. The males madly pursue the females, the pursuit ending in a leap that takes both clear of the water. While in the air the bodies come in contact, the tiny transparent eggs are fertilized and tossed in every direction. The eggs are non-adhesive and settle through the plants to the bottom where they hatch. Two males should be placed with one female to insure fertilization of the eggs. The best breeding tank is one not less than 24 inches in length that has about six inches of well aerated water that was drawn from the tap the previous day. A thick growth of plants should be used to screen the eggs until the parents can be removed.

Among the other Characins that have become popular should be mentioned the Tets. The Yellow, Red, Brass, and Blue Tets all have their supporters in a popularity contest. Their habits and requirements, so far as known, are similar to those of the Head-and-Tail-Light Fish. The Hatchet Fishes form still another group of Characins that are quite popular.

## CYPRINIDAE (The Carps and Minnows)

The Cyprinidae is the largest family of fishes. The family includes our well known food fish, the carp, and most of our native minnows. In tropical Africa and southeastern Asia the family reaches its greatest abundance in species. South America and Australia are the only continents where they are not found. With the exception of a very few native species, the Cyprinidae kept in home aquaria are native of India, southern China, and the adjacent islands.

The characteristics distinguishing the Cyprinids from the Characins were given under the last named group.

Most of the aquarium Cyprinidae need a temperature ranging from 65 to 85 degrees, They eat practically any fish food. There is great variation in the ease with which they are bred.

### Zebra Danio or Zebra Fish (Brachydanio reric)

The Zebra Danio of Bengal, India, is one of the most popular of the small-egg-laying fishes. The color is dominated by four rather broad dark metallic blue bands separated by narrow yellow stripes in the male and by narrow silvery ones in the females. It makes full use of its beautiful horizontal stripes by moving actively in schools so that a perfect stream line effect is obtained. Its beautiful coloring, mild nature, and activity, coupled with the facts that it withstands a temperature range of from 65 to 85 degrees and will take any food, make this an ideal aquarium fish.

Considerable ingenuity is required to overcome the marked tendency of these fish to eat their eggs. Quarter-inch round stones covering the bottom to depth of about one inch make a good egg trap. Closely spaced glass rods fastened together with 16-gauge aluminum or solder wire and suspended a little above the bottom may be used.

As spawning time approaches any promising looking female should be segregated and fed choice food for a week. During this time the trapped aquarium can be made ready, using seasoned water, and placed in a good light where the temperature is 77 to 80 degrees. The water should not be more than four inches deep above the trap, otherwise the eggs may be eaten as they drop. The female should be introduced a day before the males, two or three males for each female. If the fish do not spawn, it is best to separate the sexes and repeat the procedure.

The parents should be removed after spawning, and an Infusoria culture should be started, if not already growing. The eggs hatch in about two days and the young are ready for food in two more days. They should be fed live food and pushed for growth if superior specimens are desired.

The Giant and the Pearl Danios have achieved some degree of popularity. The Giant Danio reaches a length of about 4 inches. It has golden vertical and horizontal bars. The pear Danio is small, about 1-3/4 inches in length, and shows exquisite mother-of-pearl colors in reflected light. Both have temperature ranges and feeding habits similar to those of the Zebra Danio. The breeding habits of the Pearl and Zebra Danio are similar, but the Giant Danio breeds more like the B arbs, which will be discussed later.

## The Rasbora (Rasbora heteromorpha)

The Rasbora, native of the Malay Peninsula and Sumatra, is gaining rapidly in popularity now that the supply is sufficient to remove it from the rare class. Although there are several species in this genus, the trade name Rasbora has come to refer only to Rasbora heteromorpha since the others have attained little popularity.

This species is recognized by its being the only small fish (about 1-3/4 inches long) with a large blue-black triangel on the side. The best specimens have this triangle with sharply defined edges. The golden line along the top edge of the triangle is more brilliant and deeply colored on the males than on the females. The rear part of the sides and the fins are flushed with red.

The Rasbora ia an exceedingly difficult fish to breed in aquaria, although a few have been raised by lucky aquarists.

These fish are active but not nervous in movement, and are not timid although they show no signs of being aggressive. They survive with a temperature range of 68 to 88 degrees, and are adaptable to almost any food.

## The Rosy Barb (Barbus conchonius)

The Rosy Barb is the best known of the Barbs. One of the striking attractions of the fish is the large, mirror-like scales that flash and gleam in the light. The Rosy Barb may be distinguished from other Barbs by a rather large dark spot edged with gold, on the side just above the posterior part of the anal fin. The fins are orange, with the top part of the dorsal being black in the male. During the breeding season, the males develop a glowing reddish rose color. Although the genus Barbus was so named because of the presence of barbels, this species has none. The Rosy Barb grows to be about 3-1/2 inches long, with the males slightly smaller than the females. The native habitat is India.

The Rosy Barb is one of the hardiest of the Barbs. It does well in temperatures ranging from 68 to 76 degrees. They seem to grow best in aquaria containing old water and lots of plants. As to food, they accept any kind. In fact, the requirements of this fish are so simple that they can be raised in outdoor pools, during the summer. Given a large, well planted pool with a constant supply of live food, they will breed and grow without other attention.

Breeding is simple, being much like the goldfish. After the excited chase, the female scatters adhesive eggs over the plants where they are fertilized. The parents must be removed as they both show a strong tendency to eat their own eggs. The eggs hatch in from 38 to 40 hours.

At least three other Barbs enjoy considerable popularity. These are the Clown fish (Barbus everetti), the Dwarf Barb (Barbus phutunio), and the Ticto (Barbus ticto). The Clown Fish is recognized particularly by its larger blue-black spots, and its large size (reaching about 5 inches). The Dwarf Barb is just that, since it is only about 1-1/4 inches long. The psarkle is confined to verticle lines from the center of the scales. It has pale orange fins, three black spots on each side, and a translucent gill cover through which the gills may be seen. Ticto is very similar to the Rosy Barb, being just slightly smaller. The males do not develop the reddish rose color during the breeding season. There are two black spots on the side of this species and the upper part of the eye is light red.

ANABANTIDAE ( The Anabantids)

This family of fishes belongs to the order Labyrinthic, which is characterized by an air chamber, the labyrinth, above the gills. Surface air is retained in the labyrinth as a source of oxygen, but the fish is not entirely dependent on this supply since the gills, function as they do in other fishes.

Most of the species of this family are bubble nest builders. Those that have attained popularity all exhibit this peculiar breeding habit with certain variations that will be mentioned when considering the individual species.

As the breeding period approaches, the male begins to build the nest. He comes to the surface, gulps in some air, and then releases it in small bubbles enclosed in a saliva-like film. These float to the surface and form a raft. Broad-leafed plants should be provided so that the male can build the raft under one of the leaves.

After the bubble nest is completed, the male seriously seeks a mate. It is well for the owner to select a female approximately the size of the male as he is vicious at this time and may kill a smaller mate. The male drives the female towards the nest and will attack her unless she yields to his amorous advances. In this case, the pair should be separated for a time to protect the female. If repeated trials are not successful, the owner should remate the fish. In succesful matings the pair take a position beneath the raft, and the male bends his body into a crescent around the female. As the pair sinks to the bottom several eggs are extruded and immediately fertilized. Then, the male releases the female, gathers the eggs in his mouth, encloses each in a bubble, and floats them to the raft. The entire process is repeated at intervals until there are from 100 to 500 eggs in the nest.

It is advisable to remove the female as soon as the eggs are deposited, inasmuch as the male then assumes full charge and drives the female to the farthest corner of the aquarium. His first duty is to reinforce the nest. By paying strict attention to the business of bubble blowing, the nest is expanded from its original size of about 3 inches wide and a half inch deep to a size of about 4 inches wide and an inch deep.

The young hatch in about two days at the optimum temperature of from 78 to 82 degrees. They are tiny, helpless little creatures on hatching and are constantly falling out of the nest. The father gathers them up, encloses them in a bubble and floats them back to the nest where they belong. It takes about 3 days for the young to gain balance and strength necessary to look out for themselves. But the father indulgently guards his young from all enemies for about a week. He then changes his attitude, and may start eating the very ones he had protected so zealously. The paternal protection probably was needed in the native environment, but is unnecessary in the aquarium so the father may be removed after the young begin to swim about freely.

There are two chief causes of why broods fail to live. One is that the young starve to death. They are so tiny that they must be fed Infusoria. Old water, with some decaying organic matter is necessary to supply this food. The other cause is that the surface of the water becomes covered with a film of dust. This can be corrected by drawing paper lightly over the surface, and prevented by keeping the aquarium covered with glass.

## Paradise Fish (Macropodus opercularis)

The Paradise Fish, a native of eastern China, reaches a length of 3 inches and is one of the first tropical fishes used in aquaria. Since its introduction into this country just 50 years ago it has gained wide popularity.

The fins, especially those of the male, are extended into long flowing streamers. The sexes show great color differences during breeding the female becomes very pale while the male becomes almost reddish with vivid blue-green bars. At other times, the males are more of a brown with blue-green bars, and the female is much less pale.

The Paradise Fish is particularly suited to rearing in lily ponds as it can withstand temperatures as low as 50 degrees. It is sufficiently mild-mannered that it is a good community tank occupant. It will take any food, but like other Anabantids is primarily carnivorous. Dirty water seems not to cause this fish any trouble.

Breeding habits are as described for the family.

An albino strain was introduced into this country in 1933 which breeds true and is very prolific. These are even more mild-mannered than the familar colored variety.

## Siamese Fighting Fish (Betta splendens)

Although small, about 2-1/2 inches long, the Siamese Fighting Fish has caught the fancy of not only fanciers but of avowedly uninterested people. The brilliant colors and long flowing fins instantly arrest attention. The wide range of shades in blues, lavenders, greens, and reds affords a shade that is pleasing to almost any eye. But with all the variety of coloring nearly all of them have a pair of drooping, fiery red ventral fins.

The Betta' breeding habits are described for the family. They prefer slightly acid water (pH 6.8) that is clear, but with natural sediment in the

bottom. The aquarium should be well lighted and well planted. They are readily adaptable to changes in environment, standing a temperature range of from 68 to 90 degrees.

The common designation of "Fighting Fish" is well applied. The males seem to thoroughly enjoy a good fight. In Siam they are bred for that purpose. The natives consider a fish that will not fight for one hour a failure. In spite of their fighting tendencies, one male may be kept in a community tank. However, if the owner wants good looking specimens the males must be separated when about three months old.

They are in their full vigor and color between the ages of 10 months and 2 years. It is during this time that they should be mated. The flowing fins are hereditary and can be produced only by careful mating. Feeding has no special effect on the fins. Best growth and health are produced by animal foods such as daphnia, bits of fish, etc.

## Dwarf Gourami (Colisa lalia)

The Dwarf Gourami is the smallest of its near relatives, reaching a lenght of about 2 inches. The red and blue banding of the body, together with the long dorsal and anal fins that are beautifully marked in the same colors, makes this little native of Bengal one of the most beautiful of the Gouramis. One of the peculiarities of this fish, as of all of the group, is the pair of long, thread-like pectoral fins. This unusual form of fin modification adds to the attractiveness of these fish.

The Dwarf Gourami has only one outstanding fault as an aquarium fish. Its small size, beautiful coloring, peaceful nature, easy breeding and the general ease of caring for its wants makes it a practically ideal aquarium fish, but it is by nature shy and inclined to hide away in the plants. The redeeming feature of this is that when these are kept with bolder species, (those that rushes to the owner for food), the Dwarf Gourami loses his shyness and gets out in the open more.

The breeding habits of this fish differ from the description for the family in that bits of plant (Myriophyllum leaves etc.) are incorporated into the nest, and the female helps to build the nest. They breed at about 80 degrees, but withstand temperatures of from 68 to 84 degrees.

Three other Gouramis are quite popular with aquarists. They are the Giant or Striped, the Three Spot, and the Pearl Gouramis.

## Striped Gourami (Colisa fasciata)

The striped Gourami reaches a length of about 4-1/2 inches. It is less highly colored than the Dwarf, but with its gorgeous red and white fins, and blue markings on an orange to brownish body, it is far from a dull fish.

This species builds its nest of a few scattered bubbles. The eggs float to the surface and lie about more or less scattered. The male has a habit of taking a mouthful of sand and blowing it among the eggs. He also has other interesting habits of bubble blowing that apparently defies logical explanation. This fish is peaceful and is easily fed.

## Three Spot Gourami (Trichogaster trichopterus)

The Three Spot Gourami is another of the larger gouramis kept in aquaria, reaching a length of about 5 inches. They are cream to silvery in color with a black spot at the base of the tail and along the side, the third spot being the eye.

They have the breeding habits as described for the family and are peaceful, easily cared for pets. One of their advantages is that they eat Hydra when hungry.

## Pearl Gourami (Trichogaster leeri)

The Pearl Gourami owes its popularity to the pearly dots all over the body and the three single fins. During the breeding season the breast of the male is a brilliant red. This species is very gentle and neither sex eats the young. They are a rather hardy, withstanding a temperature range of 68 to 85 degrees, and will eat hydra when hungry.

## CICHLIDAE (The Cichlids)

The Cichlids are in general the large fishes of the aquarium. They are all characterized by being spiny rayed and by having only one nostril on each side. The popular species of this family are native to South America and Africa, although representatives are found in America as far north as the Rio Grande River, Texas, and in Madagascar and India. Most of the species are given to fighting, especially with members of their own species, and more especially during courtship. The larger species have a tendency to tear out plants during the breeding season.

With certain exceptions the breeding habits are very similar. The selection of a mate begins with physical combat, often ending in the death of the weaker of the pair. After mating has been accomplished, the pair sets about preparing for the actual spawning. The owner should provide a large aquarium of not less than 10 gallon capacity, preferably 20 gallons. The water should be old, with a temperature of from 75 to 85 degrees. The best bottom is about two inches of well washed sand. Plants should be omitted for most species. The fish will breed readily in a moderately good light.

Both of the prospective parents begin to dig holes in the sand, and to thoroughly clean off a smooth light colored surface a few days before the eggs are to be deposited. These actions together with the development of a tube, or ovipositor, from the vent of both parents indicate that the eggs will be laid within a day or two.

During the actual spawning the female swims over the cleaned spot, touches it lightly with her ovipositor and discharges one or more slightly adhesive eggs. She is followed immediately by the male who sprays the eggs with milt. This process is repeated during perhaps two hours, at the end of which time from 100 to 500 eggs are deposited. The parents then take up the task of fanning the eggs, the labor being about equally divided between the two. The fanning appears to be an effort to prevent bacteria laden particles from settling and infecting the eggs. At least, fungused eggs are eaten in what seems to be an effort to save the remaining eggs although once the egg eating is started it frequently results

in the entire lot being devoured.

Either just before hatching or immediately afterward the eggs or tiny fry, as the case may be, are transferred to holes in the sand. The young are carried from one place to the other in the mouths of the parents.

During the 8 to 14 days the young remain in the sand they are transferred to new holes several times by the parents. At the end of this period the yolk sac is completely absorbed, and the young become free swimming. Those of the large species can ve fed small daphnia, but the smaller species require infusoria. The adults are carnivorous but few require an exclusive meat diet.

Most species are tolerant to a temperature range of from 65 to 90 degrees, although temperatures below 68 are a risk.

## Angel Fish (Pterophyllum scalare)

The Angel Fish probably ranks immediately behind Guppies and Bottas in stimulating interest in aquarium fish. Several features of this native of the Amazon valley attract even the supposedly uninterested. Being from four to five inches long at maturity and of unusual shape, nearly as deep as long, it never fails to arrest attention at first sight. The colors are bright, but not gaudy. The body is silvery with vertical bars of blue, the long fins are edged in blue, and the eye is red. A closely related species (P. eimekei) is the one most commonly seen in the aquarium. P. eimekei is some what smaller, has a redder eye, and more blue on the vertical fins than P. scalare, as well as dots on the sides.

The breeding habits are like those described for the family with two exceptions. The eggs are attached to large leaves or to dark surfaces, and the young are not buried in the sand. Removable egg collectors such as a gl ss tube slipped over the drain pipe, oil lamp chimneys painted on the inside, or bakelite cylinders may be used to advantage.

When the young hatch they remain suspended by a sticky thread from the head. The parents take up a mouthful of young at frequent intervals and spray them on another location. Broods have been raised successfully without separation from the parents, but such a procedure is risky as frequently the parents will devour an entire brood without apparent reason.

When one's main object is raising more fish the eggs should be removed to hatching trays or aquaria containing not more than four inches of perfectly clean seasoned water. The artificial egg collectors are a practical convenience in this procedure.

The young do not resemble the adult form. They have more the typical shape of the Cichlid, but within a few weeks they begin to assume the deep body form of the adult.

These fish are carnivorous and are especially fond of live mosquito larvae, daphnia, small or chopped earthworms, and canned shrimp. They sometimes lose their appetite for no accountable reason. A change of diet usually corrects this condition. When all else fails, try a feeding of baby Guppies. If that fails, all one can do is try changing the aquarium or the water. They prefer slightly acid water (pH about 6.8).

The Angel Fish is not particularly susceptible to disease, but is very sensitive to shock, fright, or chill.

Two of the large Cichlids, the Chanchito (Cichlasoma facetum) and the Jack Dempsey (C. biocellatum) are popular favorites, although their 7-inch size causes them to be rather large for the ordinary aquarium. Both are natives of Brazil and have habits that are typical of the Cichlids The Chanchito is horn-colored overlaid with black vertical bars, sometimes also a black horizontal bar. The Jack Dempsey has a brownish ground color sprinkled with blue to yellowish dots that extend out on the fins. The dorsal is tipped with red. Both species are hardy, good breeders and parents, easily feed, and live a long time.

Another popular Cichlid is the Jewel Fish (Hemichromis bimaculatus). This is a native of tropical Africa and reaches a length of about 4 inches. It is one of the typically savage Cichlids. It is, however, a good parent, will withstand temperatures of from 60 to 90 degrees, and at times is gorgeously colored; the bright "jewels" stand out in sharp contrast to the background. The female is more brilliantly colored during the breeding season than is the male, which is an unusual situation among fishes.

## AMBASSIDAE (The Ambassids)

### The Glassfish ( Ambassis lala )

The Glassfish is the only one of the Ambassids that has become an aquarium favorite. They are tiny (about 1-1/2 inches long), fragile appearing fish. Their bodies are so translucent that they appear to be yellowish crystals fringed with blue.

In spite of their fragile appearance they are really quite hardy. The best temperature seems to be about 75 degrees, with about 80 degrees preferred for spawning. They are carnivorous, daphnia being an excellent food. Their greatest tolerance apparently is towards salt waters. Sea water, or sea salt added to the aquarium enriches the coloring.

The Glassfish is not bred easily, but the owner has a sporting chance of success. The water should be quite old, about 4 inches deep, and well covered with Riccia. The fish take a position side by side, then on their backs, and discharge the tiny transparent eggs into the plants. The parents should be removed immediately, although instances are reported in which neither the eggs or young were devoured by adults. The young are so tiny that they must be fed on the smallest of infusoria.

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